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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,770	03/26/2001	Tsuyoshi Kitahara	Q63724	4825

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EXAMINER

NGUYEN, LAM S

ART UNIT	PAPER NUMBER
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2853

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/816,770	Applicant(s) KITAHARA, TSUYOSHI	
	Examiner LAM S NGUYEN	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,2,6-13,15,16,18-20 and 22-28 is/are allowed.
- 6) ☒ Claim(s) 3-5,14,17 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 3-5, 14, 17, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahara et al. (EP0827838) in view of Barbehenn et al. (U.S. 5363134) and Takahiro et al. (JP 11058704).

Kitahara et al. discloses a method of jetting liquid droplets or a liquid jetting apparatus, comprising:

providing a liquid head (*FIG. 1, element 10*), including: a plurality of nozzle orifices (*FIG. 3, element 22A, and column 6, line 19-22*); a plurality of pressure generation chambers associated with the nozzle orifices (*FIG. 3, element 27, and column 7, line 38-39*); and a plurality of piezoelectric vibrators for respectively varying the volume of the associated pressure generation chamber to jet a liquid droplet from the associated nozzle orifice (*FIG. 3, element 17*);

setting a single jetting cycle as a period in which N serial drive signals are applicable to the piezoelectric vibrators to jet liquid droplets from the nozzle orifices, N being an integer (*Fig. 4: The PRINT PERIOD includes the serial DRIVE SIGNAL (N = 1) having multiple drive pulses*);

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selecting M drive signals from the N serial drive signals, M being an integer which is equal to or less than N; applying the M drive signals to the piezoelectric vibrators within the single jetting cycle (*FIG. 4: Either one of 1st- 3rd pulses (M = 1) is selected and applied to the piezoelectric element*).

Kitahara et al. does not disclose the step of providing ID data for identifying the respective nozzle orifices.

However, Barbehenn et al. discloses an integrated circuit printhead for an inkjet printer including an ID data storage for providing ID data to identify respective nozzle orifices (*column 3, line 43-53*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing apparatus disclosed by Kitahara et al. such as including the ID storage for providing the ID data of the respective nozzle orifices as disclosed by Barbehenn et al. The motivation for doing so is to be able to individually control the ejection of each nozzle in order to compensate for variations in ejection energy, ink drop volume, ink drop velocity, due to manufacturing tolerances or defects as taught by Barbehenn et al. (*column 2, lines 2-8*).

In addition, Kitahara et al. and Barbehenn et al. do not disclose the steps of providing a reference drive signal which is applied to the piezoelectric vibrator such that a reference liquid droplet having a designated amount is jetted from the nozzle orifice; applying the reference drive signal to the respective piezoelectric vibrators to jet liquid droplet from the nozzle orifices; measuring amounts of the respective liquid droplets jetted by the reference drive signal; identifying a difference between the designated amount and the measured amount of each liquid

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droplet; providing correction data for reducing the difference; associating the correction data with the respective nozzle orifices identified by the ID data; storing the associated correction data, providing a plurality of drive signals for driving the piezoelectric vibrators to jet liquid droplets from the nozzles; selecting at least one drive signal from the plurality of drive signals based on the associated correction data when the identified nozzle orifice receives print data **(Referring to claims 14, 17).**

Takahiro et al. discloses a process used in an image forming apparatus comprising the steps of providing a reference drive signal to instruct the piezoelectric vibrator to jet a reference liquid droplet having a designated amount from the nozzle orifice (*paragraph [0023]: a corresponding drive waveform is given to each ink discharge means to discharge an ink quantity that is setup beforehand*), applying the reference drive signal to the respective piezoelectric vibrators to jet liquid droplet from the nozzle orifices, measuring amounts of the respective liquid droplets jetted by the reference drive signal (*paragraph [0023]: the drive waveform is applied to the ink discharge means 1-1 to 1-N and the amount of ink ejected out from each nozzle is measured*); identifying a difference between the designated amount and the measured amount of each liquid droplet (*paragraph [0023]: comparing the reference value of the ink discharge quantity set up beforehand to the measured ink discharge value*), providing correction data for reducing the difference so that the designated amount is jetted from the nozzle orifice (*paragraph [0023]: an error with the amount of ink ejected from each nozzle is computed and the variation amendment is adjusted so the desired amount of ink is ejected from each nozzle*), associating the correction data with the respective nozzle orifices identified by the ID data (*paragraph [0023]: the amount of ink ejected is measured and used to compute the error for*

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each nozzle), storing the associated correction data (paragraph [0023]: the variation amendment table is adjusted), providing a plurality of drive signals for driving the piezoelectric vibrators to jet liquid droplets from the nozzles (FIG. 3: Waveforms 1-M), selecting at least one drive signal from the plurality of drive signals to adjust a displacement behavior of a piezoelectric vibrator associated with the identified nozzle orifice, based on the associated correction data when the identified nozzle orifice receives print data, and applying the selected drive signal to the piezoelectric vibrators (Abstract and FIG. 1: the selectors 3-1 to 3-N, based on the correction data of the ink discharge amount, select a voltage waveform from a plurality of waveforms generated by the generators 2-1 to 2-N to control the liquid ejection of the discharge elements 1-1 to 1-N), wherein the at least one drive signal within a single jetting cycle of the jetting head is selected in the selecting step (FIG. 3: Each waveform 1-N has different jetting energy and is a single waveform in a jetting cycle to cause an ejection of a droplet having an amount different from the others).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the process used in the jetting liquid droplets apparatus disclosed by Kitahara et al. in view of Barbehenn et al. such that including the steps of providing the reference drive signal to the actuator to jet a designated amount of liquid, measuring amounts of the jetted liquid droplets, identifying a difference between the designated amount and the measured amount of each liquid droplet, providing correction data for reducing the difference, and adjusting a displacement behavior of the piezoelectric vibrator based on the corrected data as disclosed by Takahiro et al. The motivation for doing so is to control the variation in the ink

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discharge quantity from each nozzle in order to obtain a record image without concentration unevenness or banding as taught by Takahiro et al. (*paragraph [0024]*).

Kitahara et al. also discloses the following claimed invention:

Referring to claim 4: wherein the selected drive signals are applied at different intervals within the single jetting cycle (*FIG. 4*).

Referring to claim 5: wherein the intervals are determined such that a phase of residual vibration of a meniscus of the liquid in the nozzle orifice is adjusted due to jetting by a preceding drive signal (*FIG. 4-7, and column 10, line 20-35*).

Referring to claim 21: wherein the serial drive signals respectively have different liquid jetting energy from each other (*FIG. 4*).

Allowable Subject Matter

2. Claims 12 and 20 are allowed and the reasons for allowance were indicated in the previous office action.

3. Claims 1-2, 6-11, 13, 15-16, 18-19, 22-28 are allowed:

Referring to claim 1: The primary reasons for the indication of the allowability of the claims is the inclusions therein, in combination as currently claimed, of the limitation that selecting at least one drive signal from the plurality of serial drive signals is neither disclosed nor taught by the cited prior art of record, alone or in combination.

Referring to claims 6, 8: The primary reasons for the indication of the allowability of the claims is the inclusions therein, in combination as currently claimed, of the limitation that generating a plurality of serial drive signals within a single jetting cycle or generating N serial

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drive signals within a single jetting cycle wherein N being an integer which is not less than 3 is neither disclosed nor taught by the cited prior art of record, alone or in combination.

Claims 2, 7, 9-11, 13, 15-16, 18-19, 22-28 are allowed because they depend directly/indirectly on claim 6 or 8.

Response to Arguments

Applicant's arguments filed 08/23/2004 have been fully considered but they are not persuasive.

Regarding to the argument of page 15: The applicants argued that Takahiro fails to disclose that the selector select the drive voltage waveforms based on the variation correction data. However, as shown in Abstract and FIG. 1, Takahiro teaches that the selectors 3-1 to 3-N, based on the correction data of the ink discharge amount, select a voltage waveform from a plurality of waveforms generated by the generators 2-1 to 2-N to control the liquid ejection of the discharge elements 1-1 to 1-N. Therefore, the argument is not persuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LN
December 20, 2004



HAI PHAM
PRIMARY EXAMINER